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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WINDER, PATRICE L

ART UNIT PAPER NUMBER

2145

DATE MAILED: 06/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/900,298

Applicant(s)

SHIRRIFF, KENNETH W.

Examiner

Patrice Winder

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 23, 25, 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Yount, USPN 6,389,551 B1 (hereafter referred to as Yount).
3. Regarding claim 23, Yount taught a system that facilitates establishing a quorum for a cluster within a plurality of computers that are geographically distributed (column 2, lines 17-19, 34-39), comprising:
 - the plurality of computers (column 2, lines 17-19);
 - a network coupling the plurality of computers (column 2, lines 34-39);
 - a quorum located at a site separate from any one computer of the plurality of computers (column 2, lines 34-39); and
 - an independent communication link coupling each computer of the plurality of computers and the quorum server (separately accessible, column 2, lines 34-39).column 11, lines 48-53.
4. Regarding dependent claim 25, Yount taught the quorum server includes a mechanism for maintaining a list of computers accepted into the cluster (requests

registration of all other computers, column 2, lines 58-63).

5. Regarding dependent claim 27, Yount taught the quorum server includes monitoring means to monitor the status of each computer within the plurality of the computers (column 3, lines 10-28).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3, 5-10, 12-14, 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yount in view of Snaman, Jr. et al., USPN 6,243,744 B1 (hereafter referred to as Snaman).

8. Regarding claim 1, Yount taught a method that facilitates establishing a quorum for a cluster within a plurality of computers that are geographically distributed (column 2, lines 17-19, 34-39), the method comprising:

detecting a change in membership of the cluster at a computer within the plurality of computers (column 2, lines 45-52); and
upon detecting the change in membership:

forming a potential new cluster by attempting to communicate with all other computers within the plurality of computers (column 2, lines 58-63); and
accumulating votes for each computer successfully contacted (determining

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registrations, column 3, lines 10-22). Yount taught a quorum server resolves ownership disputes between disagreeing nodes (column 4, lines 7-11). However, Yount does not specifically teach a particular dispute mechanism.

Snaman taught a dispute mechanism comprising the steps of:

attempting to gain control of a quorum server located at a site separate from all computers within the plurality of computers (column 11, lines 48-53),

if successful, accumulating the quorum server's votes (column 11, lines 55-63), and if a total of accumulated votes includes a majority of available votes, forming a new cluster from the potential new cluster (column 11, lines 62-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made that incorporating Snaman's dispute mechanism in Yount's quorum service would have provided improved dispute resolution. The motivation would have been to prevent potential destroyed data when because of failure a single cluster is partitioned into two new clusters.

9. Regarding dependent claim 2, Yount taught wherein detecting the change in membership involves:

exchanging heartbeat messages with all computers that are part of the cluster (column 1, lines 14-19); and

upon discovering an absence of heartbeat messages from any computer in the cluster, initiating a cluster membership protocol (column 2, lines 47-52).

10. Regarding dependent claim 3, Snaman taught detecting the change in cluster membership includes detecting that the cluster has not been formed (column 8, lines

45-57, column 9, lines 10-22).

11. Regarding dependent claim 5, Yount taught exchanging a status message with each member of the new cluster (column 2, lines 58-63); and

updating a local status at the computer to a most recent status available within the status message (column 3, lines 10-28).

12. Regarding claim 6, Yount taught a method that facilitates establishing a quorum for a cluster within a plurality of computers that are geographically distributed (column 2, lines 17-19, 34-39), the method comprising:

providing a quorum server at a site separate from a location of a computer within the plurality of computers (column 2, lines 34-39); and

attempting to establish control over the quorum server from each computer within the plurality of computers (column 2, lines 58-63); and

attempting to establish communications between each pair of computers within the plurality of computers (column 1, lines 14-19). Yount taught a quorum server resolves ownership disputes between disagreeing nodes using dispute mechanism (column 4, lines 7-11). However, Yount does not specifically teach a particular dispute mechanism. Snaman taught a dispute mechanism including assigning at least one vote to each computer within the plurality of computers (column 11, lines 4-6);

assigning at least one vote to the quorum server (column 11, lines 10-11);

accumulating a count of votes for each computer communicated with at each computer (column 11, lines 48-59);

if control is established over the quorum server, accumulating the quorum

server's votes in the count of votes (column 11, lines 59-63); and

establishing the quorum when a majority of available votes has been accumulated in the count of votes (column 11, lines 59-63). For motivation for combination see claim 1, above.

13. Regarding dependent claim 7, Yount taught the quorum server grants control to only a first computer attempting to establish control (column 2, lines 58-63).

14. Regarding dependent claim 8, Yount taught the quorum server grants control to only one computer of all computers attempting to establish control based on a pre-established priority list (first computer, column 2, lines 58-63).

15. Regarding dependent claim 9, Snaman taught votes are assigned so that the quorum includes at least one computer that was in an immediately previous cluster, to ensure that a cluster formed from the quorum has current data (column 11, lines 48-53).

16. Regarding dependent claim 10, Yount taught attempting to establish control over the quorum server involves establishing communications with the quorum server (column 2, lines 58-63).

17. Claims 4, 11, 15, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yount and Snaman as applied to claims 1, 6, 12, 17, above, and further in view of Chao et al., USPN 6,438,705 B1 (hereafter referred to as .

18. Regarding dependent claim 4, Snaman taught attempting to gain control of the quorum server (column 11, lines 48-53). However, Yount-Snaman does not specifically teach communicating with the quorum server using cryptographic techniques. Chao taught communicating with the quorum server using cryptographic techniques (column

3, lines 39-60). It would have obvious to one of ordinary skill in the art at the time the invention was made that incorporating Chao's authenticated communication in Yount-Snaman's communication with a quorum server would have improved membership management. The motivation would have been to ensure system integrity.

19. Regarding dependent claim 11, Yount-Snaman does not specifically teach establishing communications with the quorum server involves using cryptographic techniques. However, Chao taught establishing communications with a quorum server involves using cryptographic techniques (column 3, lines 49-60). For motivation for combination see claim 4, above.

20. The language of claim 12-22 is substantially the same as previously rejected 1-11, above. Therefore, claims 12-22 are rejected on the same rationale as claims 1-11, above.

21. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yount in view of Snaman.

22. Regarding dependent claim 24, Yount does not specifically teach details of granting control. However, Snaman taught a quorum server includes a mechanism for granting control to one computer of the plurality of computers requesting control (column 11, lines 48-53). It would have been obvious to one of ordinary skill in the art at the time the invention was made that incorporating Snaman's mechanism for granting control in Yount's quorum server would have improved dispute resolution. The motivation would have been to provide improved dispute resolution while prevent potential data loss.

23. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yount in view of Chao.

24. Regarding dependent claim 26, Yount does not specifically teach the quorum server includes a mechanism for cryptographically ensuring an identity of a computer attempting to establish control. However, Chao taught a quorum server includes a mechanism for cryptographically ensuring an identity of a computer attempting to establish control (column 3, lines 49-60). It would have obvious to one of ordinary skill in the art at the time the invention was made that incorporating Chao's authenticated communication in Yount's communication with the quorum server would have improved membership management. The motivation would have been to ensure system integrity.

Conclusion

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

26. Cunliffe et al., USPN 5,740,348: taught solving the "split-brain" problem by introducing a mediator, external source, to cast a deciding vote when a quorum can not be reached;

27. Moiin et al., USPN 5,99,712: taught a cluster communications monitors (CMM) that maintains connectivity information to determine an optimal new cluster;


28. Moiin, USPN 6,108,699: taught each member node of a proposed cluster broadcasts a reconfiguration message and collects similar messages; if all reconfiguration messages agree, the proposed cluster is accepted;

29. Arendt et al., USPN 6,314,526 B1: taught a system for handling node failure in a cluster system by determining whether a cluster has quorum after detecting node failure;
30. Briskey et al., USPN 6,487,678 B1: taught a distributed server recovery procedure (DSRP) that allows for modification of the configuration of a server group by requiring only that a quorum of server be available for the modification to succeed;
31. Khalidi, EP 1 107 119 A2: taught forming new cluster when a quorum of nodes in the cluster agree after a communication failure;
32. Kohnen et al., EP 1 146 423 A2 : taught a voter coupled to voting processor grouping; a majority of processor groups are considered correct while the remaining minority processor grouping are reset;
33. Compaq Computer Corporation, TruCluster Server: Technical Overview – Chapter 3: Connection Manager: taught a connection manager is a distributed kernel component that tracks member status, maintains a cluster membership and detects and manages cluster partitions.
34. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrice Winder whose telephone number is 571-272-3935. The examiner can normally be reached on Monday-Friday, 10:30 am-7:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Valencia Martin-Wallace can be reached on 571-272-6159. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Patrice Winder
Primary Examiner
Art Unit 2145

June 23, 2005